TASK 4. AQUATIC HABITAT BETWEEN CAMANCHE DAM AND LAKE LODI

4.1 OBJECTIVE

The objective of this task was to characterize habitat conditions in the river, to identify the distribution and abundance of chinook salmon rearing and spawning habitat, and mapping aquatic habitats on the Mokelumne River between Camanche Dam and Lake Lodi.

4.2 METHODS

River habitats in the Mokelumne River between Camanche Dam and Lake Lodi were mapped from May-June 1990. Aquatic habitats were classified as pools, runs, riffles, or backwaters, according primarily to flow characteristics, channel morphology, and substrate type. If a habitat was found to be variable (i.e., mixture of riffle and run), the habitat was classified according to the dominant type found.

For each habitat type identified, total length, width, and depth were measured. Apart from total length, all data were collected at transects representative of each habitat. Generally, if habitats were less than 100 m in length, transects were placed in the middle of each habitat. In longer habitats (>200 m), transects at intervals of 100 m were placed. Depth was measured at three points along the transects. Substrate type was characterized within each habitat by visually estimating the river bottom area covered by fines (<2 mm), gravel (2 - 64 mm), cobble (64 - 256 mm), boulder (>256 mm), or bedrock.

Spawning areas were generally identified in riffle or run habitats with suitable substrate (cobble and gravel). For each habitat type in which spawning areas were found, a percentage of area covered by spawning habitat was assigned.

For purposes of analysis, the area of each habitat was determined by multiplying length times width. These areas were then summed to produce total area for each habitat type and for the entire river. Mean depth and width of the entire river and of each habitat type was determined by averaging all measurements taken.

The area of spawning habitat was determined by multiplying the total area by the percentage of area visually estimated to be general spawning habitat. Total and average size of the general spawning area was then calculated. The distribution of rearing habitat was assessed based on substrate type and habitat composition. It was assumed optimal rearing habitat was comprised of a mixture of riffles and runs with cobble and gravel substrate interspersed with pools.

4.3 RESULTS

A total of 29,558 m of the Mokelumne River was mapped between the footbridge located immediately below Camanche Dam and the river's confluence with Lake Lodi (Table 4.1). Total riverine area was 768,528 m^2. Flows during these surveys ranged from 170 to 290 cfs. The dominant aquatic habitat in the river from Camanche Dam to Lake Lodi was runs (83%) (Figure 4-1). Riffles, pools, and backwaters accounted for nearly equal proportions of the remaining area.
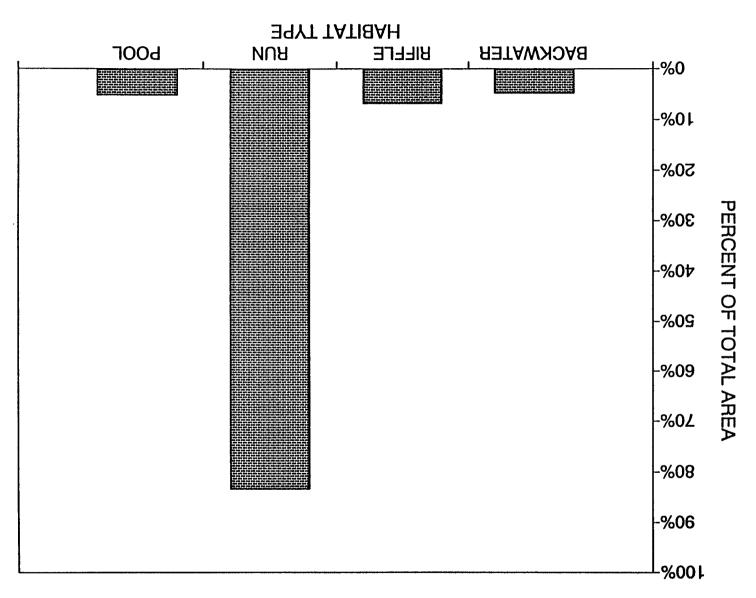
The Camanche reach can be divided into two segments based on differences in habitat type: the upper segment, which extends form Camanche Dam to 3.5 km downstream of Mackville Road; and the lower segment, from 3.5 km downstream of Mackville Road to Lake Lodi. The upper segment includes a mixture of habitat types: runs (69%), riffles (13%), pools (10%), and backwaters (8%) (Table 4.1). Fines (47%), gravel (31%), and cobble (20%) make up most of the substrate types in the upper segment. The lower segment consists primarily of runs (98%) with fines (91%); few of the other aquatic habitat types occur in the lower segment.

Almost all of the spawning habitat (96% of total area) is found in the upper segment (Table 4.1). Rearing habitat was also confined to this segment due to lack of suitable substrate in the lower segment.

Table 4.1. Characterization of aquatic habitats found on the upper and lower segments of the Camanche reach, Mokelumne River, May-June 1990. Standard deviation of means is given in parentheses.

HABITAT	N	TOTAL LENGTH (m)	MEAN LENGTH (m)	MEAN WIDTH (m)	TOTAL AREA (m²)	MEAN DEPTH (m)	% OF AREA WITH SUBSTRATE				SPAWNING HABITAT		
							Fines	Gravel	Cobble	Boulder	#	Area (m²)	% of Grand Total
UPPER SEGMENT													
POOL	8	959.8	120.3 (55.3)	36.3 (15.9)	37,054.7	2.0 (1.2)	61	23	13	3	0	—	—
RUN	120	10,673.2	88.9 (37.6)	24.0 (8.1)	271,936.6	1.1 (0.6)	45	33	20	2	42	39,559.2	45
RIFFLE	42	2,117.8	50.4 (41.7)	22.3 (6.7)	52,041.5	0.4 (0.2)	18	44	36	2	42	43,390.9	50
BACKWATER	21	1,292.0	61.5 (51.1)	21.1 (16.7)	30,597.4	1.0 (0.7)	93	6	1	0	2	1,114.8	1
TOTAL		13,057.3[1]	– –	23.8 (10.0)	391,630.2	1.0 (0.7)	47	31	20	2	86	84,064.9	96
LOWER SEGMENT													
POOL	1	223	—	—	22,969		100	0	0	0	—	—	—
RUN	178	16,844.2	94.6 (28.2)	22.1 (4.6)	368,036.5	0.9 (0.5)	90	9	<1	<1	10	3,317.8	4
RIFFLE	–	–	–	–	–	–	–	–	–	–	–	–	–
BACKWATER	7	752.6	107.5 (85.1)	12.5 (12.9)	6,727.2	0.6 (0.5)	94	6	0	0	–	–	–
TOTAL	–	16,500.3[1]	–	21.8 (5.5)	376,897.5	0.9 (0.5)	91	9	<1	0	10	–	4
GRAND TOTAL	–	29,557.6[1]	–	22.8 (8.2)	768,527.7	0.9 (0.6)	68	20	10	1	96	87,382.7	100

[1] Does not include length of backwaters or the right side of the channel when it braids

Figure 4-1. Aquatic habitat composition in the Mokelumne River between Camanche Reservoir and Lake Lodi, May–June 1990.